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BIOSYSTEMATIC STUDIES OF CEYLONESE WASPS, XXII: *BETHSMYRMILLA*, A NEW GENUS OF MUTILLID WASPS (HYMENOPTERA: MUTILLIDAE: MYRMILLINAE)

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Abstract.—***Bethsmyrmilla alticola*, new genus and new species** is described from Sri Lanka. A key is given to the Oriental genera of Myrmillinae. The halictine bee *Lasioglossum (Sudila) alphenum* (Cameron) is the probable host of *B. alticola.*

Key Words: Mutillid wasps, *Bethsmyrmilla alticola,* new genus and new species, Sri Lanka, *Lasioglossum (Sudila) alphenum* (Cameron)

Borge Petersen estimated that the mutillid fauna of Sri Lanka was 74 species based on the literature (in litt. to KVK, 1976). He mentioned that he found 45–50 species among the specimens that he had borrowed. The latter figure, however, does not incorporate a study of all of the rich mutillid fauna collected during the later years, 1975–1981, of the Smithsonian's "Ceylon Insect Project" and two visits in 1993 and 1997 by K. V. Krombein and B. B. Norden. We anticipate that a study of these collections will result in a much more accurate inventory of the mutillid fauna.

During the latest trip to Sri Lanka, Beth Norden found two females of an unusual small mutillid wasp in the ground nests of the halictine bee *Lasioglossum (Sudila) alphenum* (Cameron). These wasps belong to a new genus and species that we place in the Myrmillinae because the side of the thorax is evenly concave, the mesopleuron has a strong supracoxal carina and the pronotal-mesopleural suture is lacking except a small section above. The subfamily presently comprises three genera in the Oriental region: *Spilomutilla* Ashmead, *Squamulotilla* sensu Mickel and *Bethsmyrmilla*, new genus.

The genus *Squamulotilla* Bischoff (type species *Squamulotilla denticollis* Bischoff, male, North Cameroon, Nigeria) includes seven Afrotropical species which are known from males only. For many years Guido Nonveiller has collected and studied the mutillid fauna of Cameroon. We support his opinion (1995) that true females of *Squamulotilla* are probably described in the Afrotropical genera *Clinotilla* Arnold (males still unknown). Oriental species placed in *Squamulotilla* by Mickel (1933, 1935) comprise several undescribed genera of Myrmillinae which will be treated separately.

Depositories for specimens listed are as follows:

IBPV	Institute of Biology and Pedology, Vladivostok, Russia.
USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C. U.S.A.

Key to the Oriental Genera of Subfamily Myrmillinae

1. Female 2
– Male (unknown for *Bethsmyrmilla*) 4
2. Mandible widened apically, without subbasal tooth on inner margin (Fig. 8); gena dentate beneath; gastral tergum 2 posteriorly with three spots (Fig. 3) or a wide band of pale pubescence shallowly concave medially; gastral sternum 2 with median longitudinal carina ending usually in an acute tubercle ..... *Spilomutilla* Ashmead
– Mandible not widened apically, with subbasal tooth on inner margin (Figs. 6, 7, 9); gena not dentate beneath; gastral tergum 2 posteriorly with a band of pale pubescence that widens medially to an obtuse angle (Figs. 1, 2, 5) or with a large median spot (Fig. 4); gastral sternum 2 if carinate not ending in a tubercle . . . 3
3. Mid trochanter with narrow apical process (Fig. 12); posterolateral angles of head tuberculate behind eyes (Figs. 14, 15); thorax gently sloping posteriorly, upper margin not dentate nor serrate (Figs. 15, 16); mandible apically with a single tooth (Fig. 6) ..... *Bethsmyrmilla* Krombein and Lelej, new genus
– Mid trochanter without process; posterolateral angle of head not tuberculate but gena tuberculate below eye in *Squamulotilla lamellata* Mickel and *S. arundinacea* Pagden; thorax abruptly sloping posterorly, upper margin usually serrate or dentate, rarely with only an acute median denticle, or if not dentate at all (*S. puerilis* Cameron and *S. afghanica* Lelej) inner mandibular margin with two small preapical denticles (Fig. 9) and gastral tergum 2 with large spot of pale pubescence on posterior margin (Fig. 4) ..... *Squamulotilla* sensu Mickel
4. Apterous; mandible extremely widened apically, with deep preapical emargination; hind coxa ventrally with small, sharp posterolateral denticle; gastral sternum 8 membranous laterally, narrow median part with parallel lateral ridges ..... *Spilomutilla* Ashmead
– Alate; mandible not widened apically, inner border with two small preapical denticles and larger basal one (cf Fig. 9); hind coxa ventrally without denticles; gastral sternum 8 not membranous laterally, with median carina or tubercle; gastral terga 2–5 very often with median longitudinal carina ..... *Squamulotilla* sensu Mickel

Bethsmyrmilla Krombein and Lelej, new genus

(Figs. 1, 6, 10–18)

Type species.—*Bethsmyrmilla alticola* Krombein and Lelej, new species. The genus is monotypic.

Female.—Head large, distinctly wider than thorax, viewed from above the sides gradually widened behind eyes (Fig. 14), widened area forming a sharp tubercle as viewed from behind (Fig. 15); mandible not widened apically, inner margin with subbasal tooth (Fig. 6); medial clypeal lobe with prominent lateral tooth (Fig. 10); flagellomere I 1.8–1.9× its maximal width and 1.8–2.0× as long as flagellomere II (Fig. 11), the latter wider than its length.

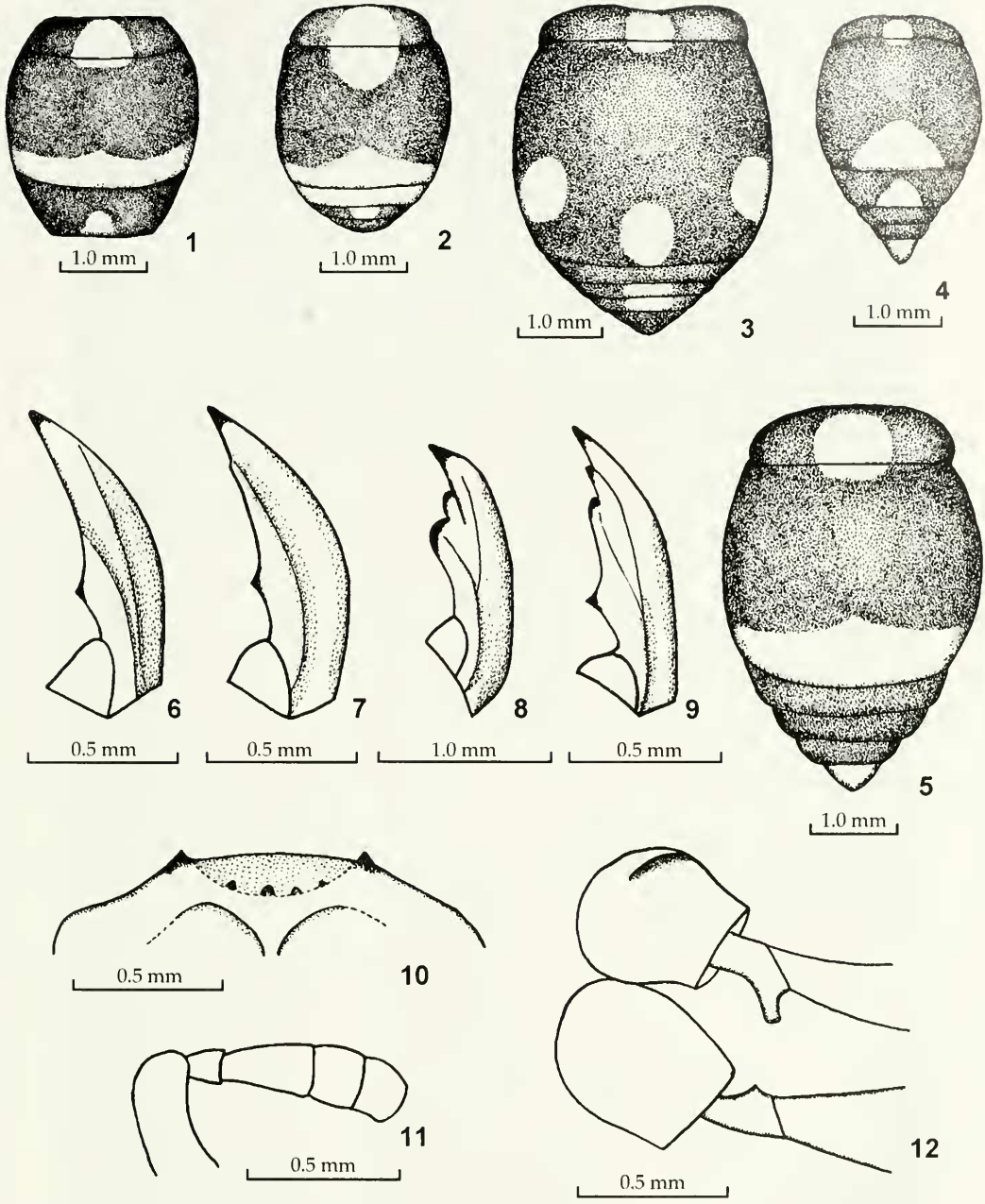
Mesosoma dorsally more or less quadrangular, laterally crenulated (Fig. 15); mesopleuron with trituberculate supracoxal carina (Fig. 16, sc); propodeal dorsum posteriorly without denticles, posterior face of propodeum sloping gently downward; fore tarsi with weak comb (Fig. 18); mid coxa ventrally with blunt tubercle and mid trochanter with narrow apical process (Fig. 12).

Dorsum of gaster with spots and bands of golden pubescence (Fig. 1); basal half of gastral sternum 2 with weak median carina that does not terminate in a tubercle.

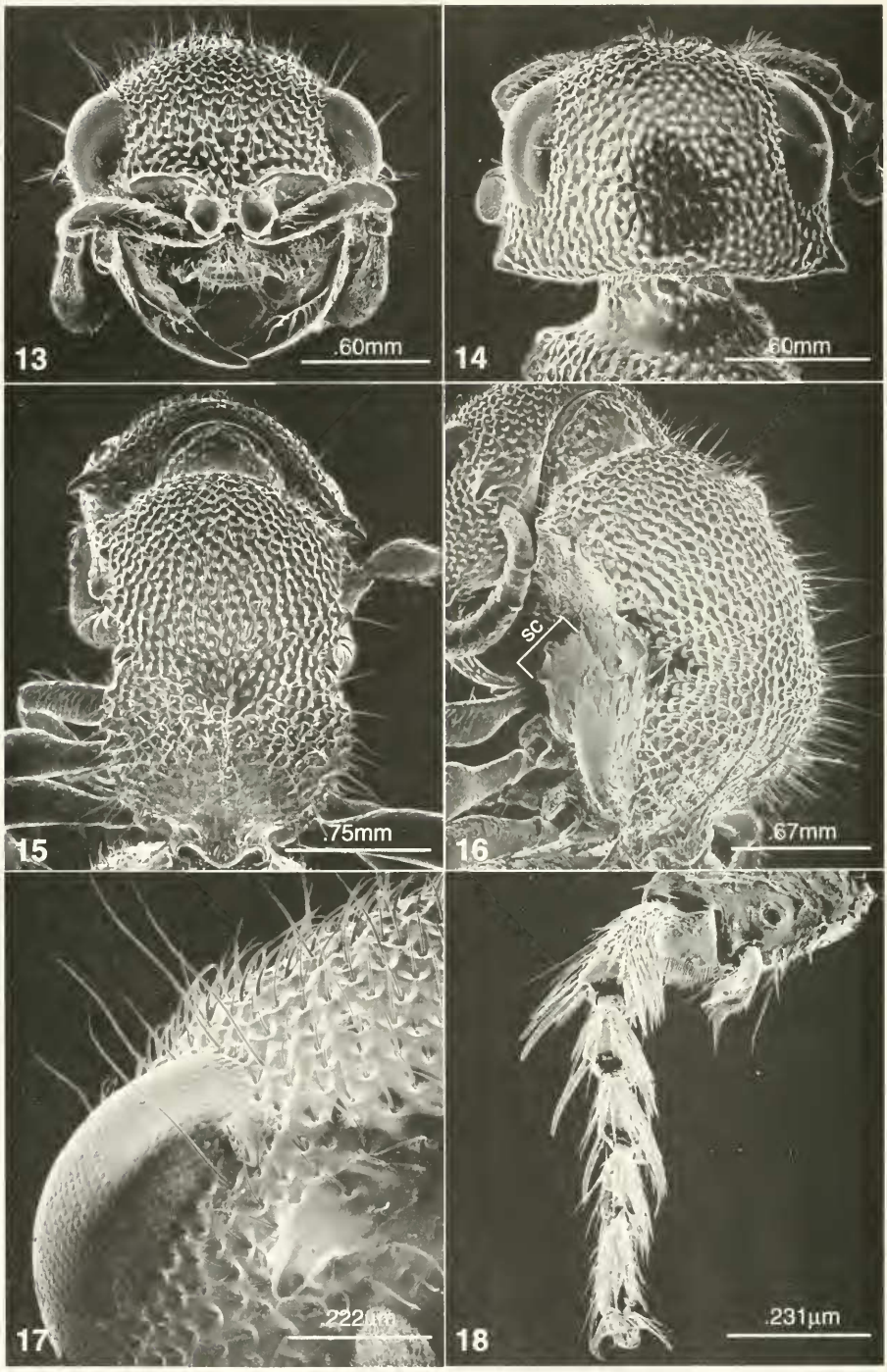
Male.—Unknown.

Discussion.—Differences of this new genus from other Oriental Myrmillinae are noted in the key. The female of *Bethsmyrmilla* is similar to those of *Squamulotilla lamellata* Mickel and *S. arundinacea* Pagden in having a lateral tubercle on the head, similarly shaped mandibles (cf Figs. 6, 7) and similar spots and bands of golden pubescence (cf Figs. 1, 2) on the gaster. It is easily separated from the latter species in lacking a tubercle on the fore coxa, in having a narrow apical process on the mid trochanter and the position of the lateral tubercle on the head, behind the eye in *Bethsmyrmilla* and beneath the eye in the latter two species. Also, the propodeal dorsum in the former is not denticulate posteriorly whereas the latter species have at least an acute median denticle.

The female of *Bethsmyrmilla* is superficially similar to another larger group of *Squamulotilla* species in having spots and bands of golden pubescence on some of the



Figs. 1–12. Females of Oriental Myrmillinae. 1–5, Patterns of pale pubescence on abdominal terga. 1, *Bethsmyrmilla alticola* holotype, Sri Lanka, terga 1–3 only. 2, *Squamulotilla lamellata*, Vietnam. 3, *Spilomutilla consolidata* (Cameron), Sri Lanka. 4, *Sq. puerilis*, South India. 5, *Sq. strangulata* (Smith), South China. 6–9, Mandible. 6, *B. alticola*. 7, *Sq. lamellata*. 8, *S. consolidata*. 9, *Sq. puerilis*. 10–12, *B. alticola*. 10, Clypeus, frontal view. 11, Antennal segments 1–5. 12, Coxa, trochanter, base of femur, mid leg above, hind leg below.



Figs. 13–18. *Bethsmyrmilla alticola*, female paratype uncoated. 13, 14, Head. 13, Frontal view (note genal tubercle extending laterad of each eye on lower margin). 14, Dorsal view. 15, 16, Thorax. 15, Dorsal view. 16, Oblique view, bracket and sc indicate supracoxal carina. 17, Head, posterolateral view, note sparse, long setae that margin eye. 18, Foretarsus, note that basal segment is angled, foreshortened.

gastral terga but differs markedly in having the lateral tubercle on the head, in lacking denticles along the posterior margin of the thoracic dorsum and in the gently rather than abruptly sloping posterior surface of the thorax.

Etymology.—We take great pleasure in naming this remarkable mutillid for Beth B. Norden, collector of the type series of *B. alticola* and discoverer of its probable host species.

Bethsmyrmilla alticola Krombein and Lelej, new species

(Figs. 1, 6, 10–18)

Female.—Length (through gastral segment 3) 5.0 mm. Red; gaster black except sternum 1 totally and tergum 1 basally red; mandible red, brownish apically; palpi brownish; scape red, flagellomeres red, darkened above; legs red, mid and hind tibiae with darker spines; mandible and clypeus with long pale erect setae, scape with shorter ones; frons and vertex with sparse recumbent, short reddish setae, genae with whitish ones; vertex and frons along eye orbit with sparse, long, erect black setae (Fig. 17); thoracic dorsum with sparse, short, subappressed black setae mixed with long, erect black ones; legs with subappressed and erect yellowish setae; pattern of golden pubescence on gaster (Fig. 1); gastral sterna 2 and 3 posteriorly with whitish fascia; propodeal hindface, gastral tergum 1 anteriorly, gastral sternum 2 and gastral terga 2 and 3 laterally with sparse, erect, whitish setae.

Head parallel behind eyes, gena posterolaterally with strong acute tubercle (Figs. 13–17); antennal scrobe well developed between antennal tubercle and lower part of eye (Fig. 13); clypeus delimited above by a weak convex carina with four small tubercles and ending laterally in a strong tooth (Figs. 10, 13); antenna with short flagellomeres (Fig. 11), flagellomere I 1.8–1.9× its apical width and 1.8–2.0× flagellomere II, the latter 0.75× its width; hypostomal carina without projection; gena below not carinate; head above with dense large punctures (Figs. 13, 14, 17). Thorax viewed from above (Fig. 15) more or less quadrangular with slightly widened pronotal and propodeal areas; humeral angles developed, lateral margin of pronotum with vertical ridge (Fig. 16); thoracic dorsum noticeably convex, weakly serrate laterally, with one lateral tubercle on the middle of mesonotum, and with dense reticulate punctures; propodeal dorsum posteriorly not dentate nor serrate; mesopleuron concave with supracoxal carina well developed, the latter with three blunt tubercles (Fig. 16, sc); mid coxa ventrally with blunt tubercle and mid trochanter with narrow apical process (Fig. 12); hind coxa carinate along posterior margin of ventral surface, carina ending in a blunt tubercle.

Gastral sternum 1 with well developed median carina; gastral tergum 2 with rather short lateral felt line and dense small punctures; gastral sternum 2 with more or less flattened central disc and dense punctures which are much sparser and larger on disc; gastral segments 4–6 lacking in holotype and 3–6 in paratype (these parts accidentally amputated and lost during nest digging).

Male.—Unknown.

Range.—The species is known only from a trail at about 1,950 m altitude along the upper border of the Hakgala Botanic Garden about 10 km S of Nuwara Eliya. We believe that it may be more widely distributed. Its probable host has been collected only at high altitudes, 1,700–1,950 m, at various localities in the districts of Nuwara Eliya (Nuwara Eliya, Hakgala, Horton Plains) and Kandy (Adam's Peak Trail).

Type material.—Holotype ♀, Sri Lanka, Nuwara Eliya District, Hakgala Botanical Garden, 6°55′N, 80°49′E, 21–22 April 1997, B.B. Norden [USNM]. Paratype ♀, same data as holotype but 24–26 February 1997 [IBPV].

Etymology.—The specific name is from the Latin *altus,* high, and *-cola,* dweller.

Natural history.—Beth Norden excavated two nests of *Lasioglossum (Sudila) alphe-*

num one each on 26 February and 22 April 1997. Each nest contained a single female mutillid. Both wasps were found at the bases of the nest tunnels and are presumed to have traveled to the farthest reaches of the vertical shafts in an effort to avoid capture.

The February nest shaft reached a depth of 7 cm and also contained a female *L. alphenum* and a female of the parasitic bee *Nomada priscilla* Nurse that were captured a few mm above the mutillid. The April nest shaft reached a depth of 13 cm. In this nest, two female *L. alphenum* were collected at depths of 12 and 12.5 cm respectively.

The mutillids moved more vigorously than the bees and were more difficult to collect. Pollen and immature bees (larvae and pupae in various stages of development) were found in cells located above the base of the nest where the wasps were retrieved.

Discussion.—Norden et al. (1994) found two females of the mutillid wasp *Pseudomethoca bethae* Krombein within a communal nest of an Arizona bee *Exomalopsis (Phanamalopsis) solani* Cockerell. One mutillid was within a provisioned cell presumably to feed on the pollen-nectar mass. Although neither specimen of *B. alticola* was in a cell with provisions, we suspect that they would use this convenient source of food while they remained within the nest. And when bee brood reached the appropriate developmental stage it would be available for parasitism. Such cryptic behavior by the mutillid would greatly lessen exposure to predators and may explain the rarity of this species in collections.

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